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EXAMINER

ZIMMERMAN, GLENN

ART UNIT

PAPER NUMBER

2879

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/642,655

Applicant(s)

STOKES ET AL.

Examiner

Glenn Zimmerman

Art Unit

2879

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on _____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-38 is/are pending in the application.
- 4a) Of the above claim(s) 32-35 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-31 and 36-38 is/are rejected.
- 7) ☒ Claim(s) 3 is/are objected to.
- 8) ☒ Claim(s) 1-38 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 August 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3 and 5.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Group I. Claims 1-31 and 36-38, drawn to a light emitting device, classified in class 313, subclass 486.

Group II. Claims 32-35, drawn to a method of generating white light, classified in class 359, subclass 634.

The inventions are distinct, each from the other because of the following reasons:

Inventions Group II and Group I are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case a generator creating a wavelength of 360nm to 425nm could be used. Also the generated light could hit the phosphor first and then the scattering particles.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

During a telephone conversation with Michael D. Kaminski on July 11, 2002 a provisional election was made with traverse to prosecute the invention of Group I, claims 1-31 and 36-38. Affirmation of this election must be made by applicant in replying to this Office action. Claims 32-35 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Information Disclosure Statement

The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609 A(1) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

Drawings

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the at least two layers of TiO₂ particles in about a 1 micron to about 2 micron thick silica layer arranged to achieve photonic crystal effects must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Art Unit: 2879

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Objections

Claim 3 is objected to because of the following informalities: the wording "the luminescent material comprises a phosphor layer or a dispersion of a phosphor and a transmissive encapsulating material" is confusing as to definiteness. The examiner suggests changing the wording to "the luminescent material comprises a phosphor layer or a dispersion of phosphor in a transmissive encapsulating material". Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

Art Unit: 2879

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) do not apply to the examination of this application as the application being examined was not (1) filed on or after November 29, 2000, or (2) voluntarily published under 35 U.S.C. 122(b). Therefore, this application is examined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

Claims 1-14, 16 and 19-24 are rejected under 35 U.S.C. 102(a and e) as being anticipated by Shimizu et al. U.S. Patent 6,069,440.

Regarding claim 1, Shimizu et al. disclose a light emitting device (**light emitting diode Fig. 2 ref. 200**), comprising: a radiation source (**InGaN LED chip ref. 202**); a luminescent material (**coating material epoxy resin which contains specified phosphor yttrium aluminum garnet activated with cerium ref. 201; col. 5 lines 65-67 and col. 6 lines 1-2; col. 16 line 49; col. 10 lines 40-42**); and a radiation scattering material (**col. 16 lines 50-52; claim 8 or conductive wires ref. 203**) located between the radiation source and the luminescent material.

Claims 2-6, 8, 9, 12 and 19-20 are rejected for the same reason as claim 1.

Regarding claim 7, Shimizu et al. disclose the device of claim 2, wherein the luminescent material comprises and organic dye (**organic fluorescent pigments col. 28 lines 25-30**).

Regarding claim 10, Shimizu et al. disclose the device of claim 9, wherein: the radiation scattering particles comprises particles selected from a group consisting of TiO_2 and Al_2O_3 (**col. 16 lines 50-52**).

The carrier medium is selected from glass, silicone and plastic material (**col. 16 lines 47-49**).

Regarding claim 11, Shimizu et al. disclose the device of claim 9 wherein: the radiation scattering particles comprise 140 to 240 nm particles selected from a group consisting of TiO₂, BaTiO₃, Al₂O₃, SiO₂, CaCO₃, BaSO₄, and diamond (**col. 16 lines 50-52; col. 17 lines 9-10**); and the carrier medium is selected from glass, epoxy, silicone and urea resin (**col. 16 lines 47-49; col. 17 line 9**). Also long as one has a particle one could measure a parameter of that particle which would be from 140 to 240 nm.

Regarding claim 13, Shimizu et al. disclose the device of claim 12, wherein the radiation scattering particles in a carrier medium comprise at least one of the following:

a) at least one light or UV radiation scattering particle layer (**col. 16 lines 50-52**) in a glass passivation layer (**col. 16 lines 47-50**) directly over the light emitting diode; and

b) light or UV radiation scattering particles in a silicone layer over the light emitting diode or over and on sides of the light emitting diode.

Regarding claim 14, Shimizu et al. disclose the device of claim 13, further comprising:

c) a light or UV radiation scattering layer on sidewalls (**col. 8 lines 55-60**) of a reflector cup portion of the package containing the light emitting diode. The phosphor in the coating material will scatter light or UV radiation and will be on the sidewalls of reference 204.

Art Unit: 2879

Regarding claim 16, Shimizu et al. disclose the device of claim 9, wherein the radiation scattering particles in a carrier medium comprise at least two layers of TiO_2 particles (**col. 16 lines 50-55; col. 17 lines 5-10**) in about a 1 micron to about a 2 micron thick silica layer (**col. 29 lines 15-20**) arranged to achieve photonic crystal effects. Example 10 discloses the use of a $120\mu\text{m}$ coating layer which will contain a 1 micron to about a 2 micron layer of silica. The layer can be glass, which is silica and may contain Titanium oxide. The titanium oxide is throughout the coating material so there will be several layers.

Regarding claim 21, Shimizu et al. disclose a white light emitting device (**abstract**), comprising: a package containing a reflector cup (**reflector and a reflector film Fig. 7 ref. 705 and 707 respectively**); a light emitting diode (**blue light emitting component/light emitting diode ref. 702; col. 3 lines 25-42**) in the reflector cup; radiation scattering particles (**dispersive sheet ref. 706 or col. 9 lines 13-18 diffused by fluorescent material also or reflector film containing white diffusing agent ref. 707; col. 17 lines 46 and 60-65**) in a packed layer or in a carrier medium over the light emitting diode; and a phosphor (**col. 20 lines 27-30; col. 4 lines 18-26**) or an organic dye which emits radiation having a second peak wavelength in response to incident light emitting diode radiation having a first peak wavelength, such that the device output appears white to an observer.

Claims 22-24 are rejected for the same reason as claim 21.

Claims 35-37 are rejected under 35 U.S.C. 102(e) as being anticipated by Höhn et al. U.S. Patent 6,245,259 B1.

Regarding claim 35 Höhn et al. disclose a light emitting device (**col. 1 lines 15-20**), comprising: a radiation source (**col. 3 lines 48-50**); a luminescent material layer (**col. 2 lines 15-26; col. 3 line 44**) which does not substantially exhibit Mie scattering; and a radiation scattering phosphor layer (**col. 2 lines 30 and 33 and 23; col. 3 line 44**), which exhibits Mie scattering of the radiation source radiation located between the radiation source and the luminescent material. The radiation source is a blue diode. The luminescent material layer is YAG:Ce with a mean grain diameter of one and two micrometers. The radiation scattering phosphor layer is also YAG:Ce and can be chosen to have a mean diameter of 120 to 200 nm. The reference discloses that the luminescent substances can have various mean grain diameter which are less than or equal to 5 microns. Therefore two mean diameter particles of YAG:Ce are chosen which are 150 nm and 1 micron diameter particles. Therefore the light emitting device has a luminescent material layer which does not substantially exhibit Mie scattering i.e. YAG:Ce with mean diameter particles of 1 micron, and there is a Mie scattering layer i.e. YAG:Ce with mean diameter particles of 150 nm.

Claim 36-37 are rejected for the same reason as claim 35.

Claim 36 is rejected under 35 U.S.C. 102(b) as being anticipated by Matsuda et al. U.S. Patent 5,808,409.

Regarding claim 36, Matsuda et al. disclose a light emitting device (**Abstract; Fig. 3**), comprising: a radiation source; a luminescent material layer (**col. 6 lines 8-11**) which does not substantially exhibit Mie scattering; and a radiation scattering phosphor

Art Unit: 2879

layer (col. 6 lines 25-30 and 12-15), which exhibits Mie scattering of the radiation source radiation located between the radiation source and the luminescent material.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 15, 17, 18, 25 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimizu et al. U.S. Patent 6,069,440.

Regarding claim 15, Shimizu et al. disclose the claimed invention except for the use of silicone. It has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416. Thus, it would have been obvious to one having ordinary skills in the art at the time the invention was made to have silicone used with the light emitting diode, since the selection of known materials for a known purpose is within the skill of the art.

Regarding claim 17, Shimizu et al. disclose the claimed invention except for the limitation of wherein a mean diameter of the radiation scattering particles is between $\lambda/3$ and $\lambda/2$, where λ is the peak emission wavelength of the radiation source. It has been held that discovering an optimum value of a result effective variable involves only

Art Unit: 2879

routine skill in the art. *In re Boesch*, 205 USPQ 215 (CCPA 1980). Thus, it would have been obvious to one of ordinary skills in the art at the time the invention was made to have wherein a mean diameter of the radiation scattering particles is between $\lambda/3$ and $\lambda/2$, where λ is the peak emission wavelength of the radiation source, since discovering an optimum value of a result variable is considered within the skills of the art.

Claims 18 and 31 are rejected for the same reason as claim 17.

Regarding claim 25, Shimizu et al. disclose the claimed invention except for the limitation of particles having a mean diameter of 50 to 500 nm. It has been held that a change in size or shape is generally recognized as being within the level of ordinary skill in the art. *In re Rose*, 105 USPQ 237 (CCPA 1955). *In re Daily*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966). It would have been obvious to one having ordinary skill in the art to use particles having a mean diameter of 50 to 500 nm, because changes in size or shape are within the skill of the art. Silicone is very common see rejection to claim 27.

Referring to claim 26, Shimizu et al. teach all of the limitations of the claim. Shimizu et al. teach the device according to claim 25 wherein the light scattering particles in a carrier medium comprise at least one of the following:

- a) light or UV radiation scattering particles in a glass passivation layer (**col. 16 lines 50-55; col 7 lines 5-15**) over the light emitting diode; and
- b) light or UV radiation scattering particles in a silicone layer (silicon resin over the light emitting diode or over and on sides of the light emitting diode).

Claims 27-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shimizu et al. U.S. Patent 6,069,440 in view of Jaffe U.S. Patent 3,760,237.

Regarding claim 27, Shimizu et al. teach all the limitations of claim 27, but fail to teach a silicone layer. Jaffe in the analogous art teach a silicone layer (**col. 2 lines 65-70**). Additionally, Jaffe teaches incorporation of such a silicone layer to improve encapsulation (**col. 2 lines 55-70**).

Consequently it would have been obvious to a person having ordinary skill in the art at the time the invention was made to use a silicone layer in light emitting device of Shimizu et al. since such a modification would improve encapsulation as taught by Jaffe.

Referring to claim 27, Shimizu et al. teach all of the limitations of the claim. Shimizu teach the device of claim 26, wherein the light scattering particles in a carrier medium comprise both a), b) (mentioned above) and c) a light or UV radiation scattering layer on sidewalls of the reflector cup (**col. 15 lines 45-55**).

Claims 28 and 29 are rejected for the same reason as claim 25.

Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shimizu et al. U.S. Patent 6,069,440 in view of Jaffe U.S. Patent 3,760,237 and Jüstel et al. U.S. Patent 6,084,250.

Regarding claim 30 Shimizu et al. and Jaffe teach all the limitations of claim 30, but fail to teach wherein the light or UV radiation scattering layer on the sidewalls of the reflector cup comprises a MgF_2 layer or a polymer layer. Jüstel et al. in the analogous art teach a polymer layer used with a reflecting cup/bowl (**col. 3 lines 1-10**).

Art Unit: 2879

Additionally, Jüstel et al. teach incorporation of such a Polymer layer to improve decoupling of light (**col. 3 lines 5-10**).

Consequently it would have been obvious to a person having ordinary skill in the art at the time the invention was made to use a polymer layer in the light emitting device of Shimizu et al. and Jaffe since such a modification would improve decoupling of light as taught by Jüstel et al.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Duggal et al. U.S. Patent 6,357,889 B1 disclose a Color Tunable Light Source. Wang et al. U.S. Patent Application Publication 2002/0084745 A1 disclose a Light Emitting Diode with Light Conversion by Dielectric Phosphor Powder. Lester et al. U.S. Patent 5,777,433 disclose a High Refractive Index Package Material and a Light Emitting Device Encapsulated with such Material.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Glenn Zimmerman whose telephone number is (703) 308-8991. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (703) 305-4794. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7382 for regular communications and (703) 308-7382 for After Final communications.

Art Unit: 2879

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is n/a.


Glenn Zimmerman
July 19, 2002


MICHAEL H. DAY
PRIMARY EXAMINER